

## CLAIMS

What is claimed:

1. A sampling device for detecting an analyte of interest in a difficult-to-access sampling location, comprising:
  - a chamber having at least one part of a wall of the chamber defined by a semipemeable membrane;
  - the semipermeable membrane, wherein the semipermeable membrane is permeable to the analyte of interest;
  - a first channel communicating with the chamber; and
  - a second channel communicating with the first channel through the chamber, wherein the first channel and the second channel enable a carrier fluid to be transported from the chamber to a sample delivery site.
2. The sampling device of Claim 1 further comprising a protective layer surrounding the first channel and the second channel.
3. The sampling device of Claim 1 further comprising a shell surrounding the chamber.
4. The sampling device of Claim 3, wherein the shell surrounds the first channel and the second channel.
5. The sampling device of Claim 3 or 4, wherein the shell is removable.
6. The sampling device of Claim 3 or 4, further comprising a probe tip for insertion of the sampling device into the sampling location, wherein the probe tip engages the shell and the sampling device is disposed on a surface of the probe tip.
7. The sampling device of Claim 1, further comprising a sample collector and a source of pressurized fluid connected to the second channel, wherein the pressurized fluid is capable of driving the carrier fluid from the chamber through the first channel to the sample collector.
8. The sampling device of Claim 1, further comprising:
  - an analytical instrument communicating with the chamber through the first channel;

and a source of pressurized fluid connected to the second channel, wherein the pressurized fluid is capable of driving the carrier fluid from the chamber through said first channel to the analytical instrument.

9. The sampling device of Claim 7 or 8, wherein a pump is the source of the pressurized fluid.
10. The sampling device of Claim 1, wherein the semipermeable membrane is in the shape of a tube and the internal space of the tube comprises the chamber.
11. The sampling device of Claim 10, wherein the tube comprises a silicone tube.
12. An array of sampling units, wherein each of the sampling units comprises the sampling device of any one of Claims 1 to 5 positioned at a different sampling location.
13. The array of sampling units of Claim 12, wherein the different sampling location is at a different horizontal location.
14. The array of sampling units of Claim 12, wherein the different sampling location is at a different vertical location.
15. A method of obtaining a sample for detecting an analyte of interest in a difficult-to-access location, comprising the steps of:
  - a) positioning the sampling device of Claim 1 in a sampling location;
  - b) allowing the analyte of interest to permeate through the semipermeable membrane into the chamber, wherein the chamber contains a carrier fluid; and
  - c) transporting the carrier fluid from the chamber through the first channel.
16. The method of Claim 15, wherein the transporting of the carrier fluid is to a sample collector.
17. The method of Claim 15, wherein the transporting of the carrier fluid is to an analytical instrument.

18. The method of Claim 15, wherein transporting the carrier fluid from the chamber through the first channel occurs at periodic intervals.
19. A method of installing a sampling system, comprising
  - a) directing a sampling probe to a sampling location, wherein the probe comprises the sampling device of Claim 1 enclosed in a shell; and
  - b) withdrawing the shell.
20. The method of Claim 19, further comprising filling the spaces previously occupied by the shell.